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TITLE: PROBE DEVICE

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INT-CL (IPC): H01L021/66 , G01R031/26

ABSTRACT:

PURPOSE: To perform electrical measurement on an IC chip on a wafer for example with high precision and moreover to make it possible to perform at a high frequency.

CONSTITUTION: An interface board 5 is united into one body with a probe card 2 having probe needles 21 to be brought into contact with an IC chip on a wafer W, and the probe card 2 and the performance board of a test head 3 are made to touch electrically through the medium of this interface board 5. The interface board 5 is constituted by applying rubber sheets 7 on both sides of a printed board 6 respectively. These rubber sheets 7 are composed of contact parts 71 made of pressure conductive rubber changeable into conductive material by applying pressure, formed at corresponding parts to the respective electrodes 32 and 24 of the performance board 31 and the probe card 2, and insulating rubber layer 72 provided at parts other than the contact parts 71.

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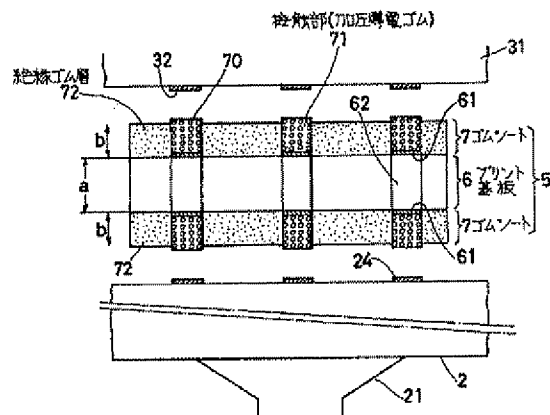
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(54)【発明の名称】 プローブ装置

(57)【要約】

【目的】 例えばウエハ上のICチップについて高い精度で電気的測定を行い、かつ高い周波数で測定可能にすること。

【構成】 ウエハW上のICチップに接触されるプローブ針21を備えたプローブカード2にインターフェイスボード5を一体的に設け、このインターフェイスボード5を介してプローブカード2とテストヘッド3のパフォーマンスボード31とを電気的に接触させるようにする。インターフェイスボード5はプリント基板6の両面に夫々ゴムシート7を貼着して構成され、このゴムシート7は、パフォーマンスボード31及びプローブカード2の各電極32、24に対応する部分においては、加圧されて導電性となる加圧導電ゴムよりなる接触部71が形成され、その他の部分は絶縁ゴム層72により構成される。



CLAIM + DETAILED DESCRIPTION

[Claim(s)]

[Claim 1] While contacting the probe needle of a probe card to the electrode pad of an inspected object in the probe equipment which the electrode of a probe card and the electrode of a test head are contacted electrically, and measures the electrical property of an inspected object. Probe equipment characterized by making the contact part which consists of pressurization electric conduction rubber which serves as conductivity when pressurized intervene between the electrode of said probe card, and the electrode of a test head.

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to probe equipment.

[0002]

[Description of the Prior Art] [in the manufacturing process of a semiconductor device, after IC chip is completed in a wafer, it is divided by each chip and packaging is carried out to it, but] In order to eliminate a poor chip before packaging is carried out, electric measurement called a probe test to each chip in a wafer by probe equipment is performed.

[0003] [equipment] as conventional probe equipment is shown, for example in drawing 4 , while arranging the wafer maintenance stand 11 which can move in X, Y, Z, and the direction of theta in a case 1 Form the probe card 2 which equipped the upper part side of this wafer maintenance stand 11 with the probe needle 21, and the insert ring 23 equipped with what is called POGOPIN 22 always energized in the projection direction is minded. A case 1 is equipped with said probe card 2, and it prepares free [rotation] and is constituted so that the performance board 31 of the test head 3 electrically connected to Testa who does not illustrate further may be attached and detached on the upper surface of said insert ring 23.

[0004] While making it contact where it raised the wafer maintenance stand 11 with such equipment and position ***** of the probe needle 21 is carried out at the electrode pad of IC chip in Wafer W Testa who the performance board 31 of the test head 3 is electrically contacted to a probe card 2 through POGOPIN 22 of an insert ring 23, and does not illustrate it performs electric measurement, and he is trying to judge the quality of IC chip.

[0005]

[Problem to be solved by the invention] By the way, [with conventional probe equipment, in order to contact electrically the electrode of the performance board 31, and the electrode of a probe card 2, use POGOPIN 22, but] Since POGOPIN 22 acquires a positive contact state using the stability of an elastic body and the height of an insert ring 23 is needed about at least

30mm in order to secure a predetermined stroke, the thickness of the contact part which equipped both ends with POGOPIN 22 will be set to 60mm or more.

[0006] However, if the performance board 31 and the probe card 21 are separated 60mm or more The coaxial structure which surrounds the circumference of POGOPIN with an insulator in order to take matching of impedance and to avoid the influence of a noise is needed.

Moreover, since impedance, a KONDAKU wardrobe, and an inductance exist in the signal way of an insert ring 23, the big waveform distortion about the pulse inputted into the performance board 31 arises from the pulse or chip for inspection inputted into a chip, and a high-precision inspection becomes difficult. And in transmission of the pulse of high frequency since pulse delay arises in proportion to the length of a signal cable Very high-speed processing was inadequate for conducting the characteristic inspection of the chip demanded like the chip which making frequency of an inspection pulse high has restriction, and is used for a supercomputer etc.

[0007] This invention is made by the basis of such a situation, the purpose can perform high-precision measurement, and it is in offering the probe equipment which can moreover be measured with the number of high frequency.

[0008]

[Means for solving problem] [this invention] while this invention contacts the probe needle of a probe card to the electrode pad of an inspected object The electrode of a probe card and the electrode of a test head are contacted electrically, and in the probe equipment which measures the electrical property of an inspected object, when pressurized between the electrode of a probe card, and the electrode of a test head, it is characterized by making the contact part which consists of pressurization electric conduction rubber used as conductivity intervene.

[0009]

[Function] For example, supposing it forms in the position corresponding to the electrode of a probe card, and the electrode of a test head the contact part which consists of pressurization electric conduction rubber by both sides of a printed circuit board, respectively Since a contact part is pressurized and it becomes conductivity when this printed circuit board is compressed between a probe card and a test head, a probe card and a test head contact electrically. and -- since a contact part has elasticity, the variation in the height of an electrode can be absorbed, it can be made to be able to contact certainly and thickness of a contact part can moreover be shortened extremely -- estrangement with a probe card and a test head -- distance can be shortened.

[0010]

[Working example] The vertical section side view in which drawing 1 shows the work example of this invention, and drawing 2 are the decomposition enlarged drawings showing the important section of the work example of this invention. One in drawing 1 is a case which

makes the exterior part of the main part of probe equipment, and the wafer maintenance stand 11 which can move in X, Y, Z, and the direction of theta is installed by the drive mechanism which is not illustrated in this case 1. The head ring-like plate 4 is inserted and formed in the upper surface of said case 1, and in this head plate 4, it is attached through the attachment ring 41 so that the probe card 2 which equipped the undersurface side with the probe needle 21 may counter with the wafer maintenance stand 11.

[0011] The test head 3 equipped with the performance board 31 is formed in the upper part side of said probe card 2 free [attachment and detachment] to the upper surface of a case 1. In the undersurface of the performance board 31, the input-and-output terminal for outputting the electric signal for inspection or receiving an electric signal from the probe card 2 side is made, for example, the electrode 32 (refer to drawing 2) which consists of copper is arranged on it. The Interface Division board 5 for contacting electrically said performance board 31 and the probe card 2 concerned is formed in the upper surface of said probe card 2 in one with the probe card 2 by adhesives.

[0012] A rubber sheet 7 is stuck on both sides of the printed circuit board 6, respectively, and while having the electrode 61 which consists of copper, as for said printed circuit board 6, the signal way 62 is formed at both sides for example, between the corresponding electrodes 61 by the side of the surface and the back, so that said Interface Division board 5 may be expanded to drawing 2 and may be shown. In the field in contact with an electrode 61, each rubber sheet 7 is constituted by the insulating rubber layer 72 in the other portion while it is constituted by the contact part 71 which covers the back from the surface and consists of pressurization electric conduction rubber.

[0013] [moreover, the electrode 61 by the side of the surface of said printed circuit board 6 and the electrode 61 by the side of the back] Corresponding to the arrangement of the electrode 32 of the performance board 31, and the electrode 24 of a probe card 2, it is arranged, respectively, and the contact part 71 by the side of the back of the Interface Division board 5 always touches the electrode 24 of a probe card 2. Said pressurization electric conduction rubber has the function in which only the pressurized portion becomes conductivity, for example, in the thickness direction of a silicone rubber layer, the metal particulates 70 are arranged, and it is constituted, and in this example [the contact part 71] In order to make contact with the electrode 32 of the performance board 31 much more reliable, it has projected rather than the insulating rubber layer 72. In addition, it is not necessarily required to make the contact part 71 project in this way.

[0014] Since thickness a of the printed circuit board 6 is about 0.3-0.5mm about said Interface Division board 5 and thickness b of the rubber sheet 7 by the side of both sides of the printed circuit board 6 is about 0.1mm respectively here, the whole thickness is about 0.5-0.7mm.

[0015] Next, an operation of the above-mentioned work example is described. If the

performance board 31 of the test head 3 is first pushed against the surface of the Interface Division board 5 from the state shown in the left-hand side of drawing 3. Each electrode 32 of the performance board 31 contacts the surface of the contact part 71 which consists of pressurization electric conduction rubber by the side of the upper surface of the Interface Division board 5, and presses the surface concerned. While the contact part 71 which the metal particulates in pressurization electric conduction rubber contact **, and forms an electric conduction way as shown in the right-hand side of drawing 3 as a result, and touches the electrode 32 becomes conductivity. Since it is pressurized also about the contact part 71 by the side of the back of the Interface Division board 5, it becomes conductivity. This sake From the electrode 32 of the performance board 31, through the electrode 61 by the side of the contact part 71 by the side of the surface of the Interface Division board 5, the electrode 61 by the side of the surface of the printed circuit board 6, the signal way 62, and the back, and the contact part 71 by the side of the back of the Interface Division board 5 [the electrode 24 of a probe card 2] An electric conduction way is formed and the electric contact with the performance board 31 and a probe card 2 is attained.

[0016] Subsequently, raise the wafer maintenance stand 11 with the drive mechanism which is not illustrated, and Wafer W and the probe needle 21 which are an inspected object are made to approach. Position ***** of X to the electrode pad of the chip of Wafer W of the probe needle 21, Y, Z, and the direction of theta is performed observing through the window which the test head 3 illustrates by neither a microscope nor CRT. An inspection pulse is inputted [after that] into IC chip on Wafer W through the Interface Division board 5 and a probe card 2 on the frequency of 100MHz from the performance board 31 side, and a predetermined electrical property is measured based on the pulse outputted from the chip side with the test head 3.

[0017] In order to try to contact a probe card 2 and the performance board 3 electrically through a rubber sheet 7 according to such a work example, For example, even if variation is in the height of electrodes 24 and 32 by a probe card 2, the curvature of the performance board 31, etc., the variation can be absorbed, electric contact can be made into a positive thing, and there is no fear of loose connection.

[0018] and estrangement with a probe card 2 and the performance board 31 -- [distance /mm / about 0.5-0.7] since distance is very short Impedance, an inductance, and a KONDAKU wardrobe are small, therefore the grade [pulse] of waveform distortion is very small, and since high-precision measurement can be performed for this reason and it is not necessary to adopt coaxial structure, structure is also easy. And since the pulse time delay is very small, it can opposite-** enough again also about the chip as which very high-speed processing is required like the chip which can make frequency of an inspection pulse high, for example, is used for a supercomputer etc.

[0019] Above [board / 5 / Interface Division] [it is good also as the performance board 31 and solid construction, and] instead of considering it as a probe card 2 and solid construction It is good also as structure of contacting by the pressurization electric conduction rubber projected without using the insulating rubber layer 72, and it is desirable to adopt structures, such as to make the portion which contacts the electrode 32 of the performance board 31 or the electrode 24 of a probe card 2 in this case project rather than other portions etc.

[0020] Moreover, the Interface Division board 5 sticks a rubber sheet 7 only on the whole surface side of the printed circuit board 6 like the above-mentioned work example. On the other hand, it is good for a side also as structure which used POGOPIN, and only the insulating rubber sheet supporting the electric conductor by pressurization electric conduction rubber may constitute, without using the printed circuit board 6. In addition, as an inspected object, you may be not only a semiconductor wafer but an LCD board etc.

[0021]

[Effect of the Invention] In order according to this invention to make pressurization electric conduction rubber intervene and to contact the probe card and the test head electrically, estrangement with a probe card and a test head -- since distance is short, therefore the pulse time delay is short while being able to perform electric measurement of an inspected object in high accuracy, since signal waveform distortion is small, it can measure on high frequency.

[Translation done.]

PRIOR ART

[Description of the Prior Art] [in the manufacturing process of a semiconductor device, after IC chip is completed in a wafer, it is divided by each chip and packaging is carried out to it, but] In order to eliminate a poor chip before packaging is carried out, electric measurement called a probe test to each chip in a wafer by probe equipment is performed.

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EXAMPLE

[Working example] The vertical section side view in which drawing 1 shows the work example of this invention, and drawing 2 are the decomposition enlarged drawings showing the important section of the work example of this invention. One in drawing 1 is a case which makes the exterior part of the main part of probe equipment, and the wafer maintenance stand 11 which can move in X, Y, Z, and the direction of theta is installed by the drive mechanism which is not illustrated in this case 1. The head ring-like plate 4 is inserted and formed in the upper surface of said case 1, and in this head plate 4, it is attached through the attachment ring 41 so that the probe card 2 which equipped the undersurface side with the probe needle 21 may counter with the wafer maintenance stand 11.

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[Translation done.]

[Brief Description of the Drawings]

[Drawing 1] It is the vertical section side view showing the work example of this invention.

[Drawing 2] It is the decomposition enlarged drawing showing the important section of the work example of this invention.

[Drawing 3] It is the operation explanatory view of the work example of this invention.

[Drawing 4] It is the vertical section side view showing conventional probe equipment.

[Explanations of letters or numerals]

1 Case

2 Probe Card

3 Test Head

31 Performance Board

5 Interface Division Board

6 Printed Circuit Board

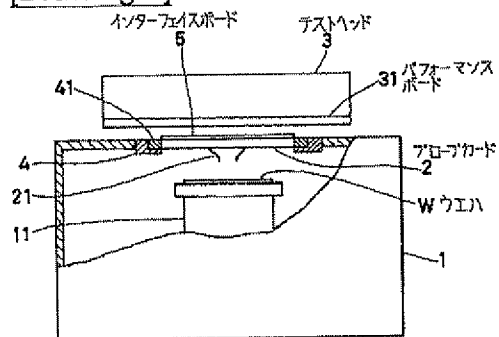
71 Contact Part Which Consists of Pressurization Electric Conduction Rubber

72 Insulating Rubber Layer

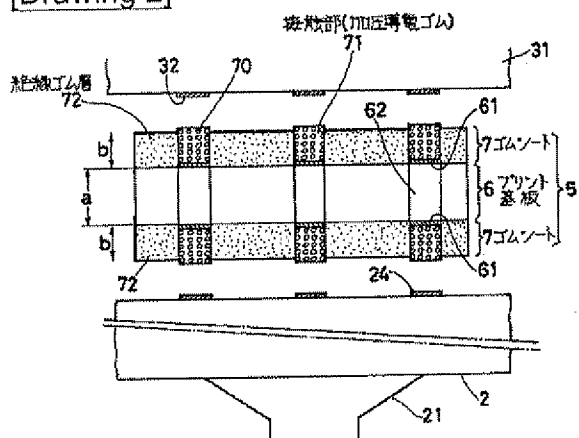
24, 32, 61 Electrode

[Translation done.]

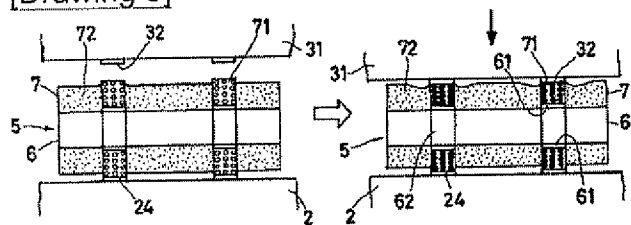
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Drawing 4]

